



# Was Project Management Life Really Better in Apollo?

**Edward (Ted) Kenny** is the Associate Project Manager for the Cx Mission Operations Project, an aficionado of space history (including as NASA project manager for the recent Apollo History project creating on-line lessons to help CxP personnel with Apollo background) and a involved with the creation of some more recent NASA history with the space station from the requirements phase through actually sending the ground commands to mate the first U.S. Elements together.

**Brad Stewart** is the lead Resource Analyst/Cost Estimator and general financial advisor for the CxP Mission Operations Project and therefore easily one of the most indispensable people in the entire project. He has the honor of having a direct tie back to the resources offices of Apollo through his father and brings to the NASA community his own unique outside perspective from his experience in the industry.



# Was Project Management Life Really Better in Apollo?

we choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.



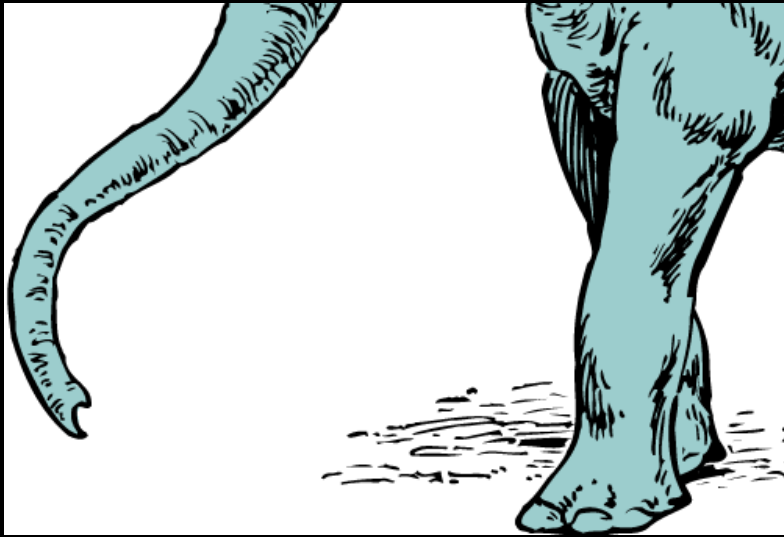
Despite the striking fact that most of the scientists that the world has ever known are alive and working today, despite the fact that this Nation's own scientific manpower is doubling every 12 years in a rate of growth more than three times that of our population as a whole, despite that, the vast stretches of the unknown and the unanswered and the unfinished still far outstrip our collective comprehension

we meet in an hour of change and challenge, in a decade of hope and fear, in an age of both knowledge and ignorance. The greater our knowledge increases, the greater our ignorance unfolds.

It is for these reasons that I regard the decision last year to shift our efforts in space from low to high gear as among the most important decisions that will be made during my incumbency in the office of the Presidency.

This year's space budget is three times what it was in January 1961, and it is greater than the space budget of the previous eight years combined. That budget now stands at 5 billion 400 million dollars a year--a staggering sum, though somewhat less than we pay for cigarettes and cigars every year. Space expenditures will soon rise some more, from 40 cents per person per week to more than 50 cents a week for every man, woman and child in the United States, for we have given this program a high national priority--even though I realize that this is in some measure an act of faith and vision, for we do not now know what benefits await us.

**Well, space is there, and we're going to climb it, and the moon and the planets are there, and new hopes for knowledge and peace are there. And, therefore, as we set sail we ask God's blessing on the most hazardous and dangerous and greatest adventure on which man has ever embarked.**





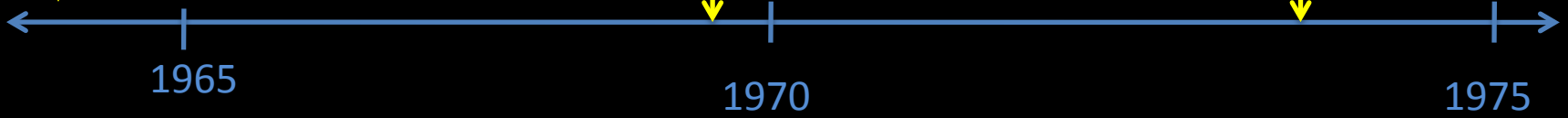
Kennedy  
Speech  
(9/1962)

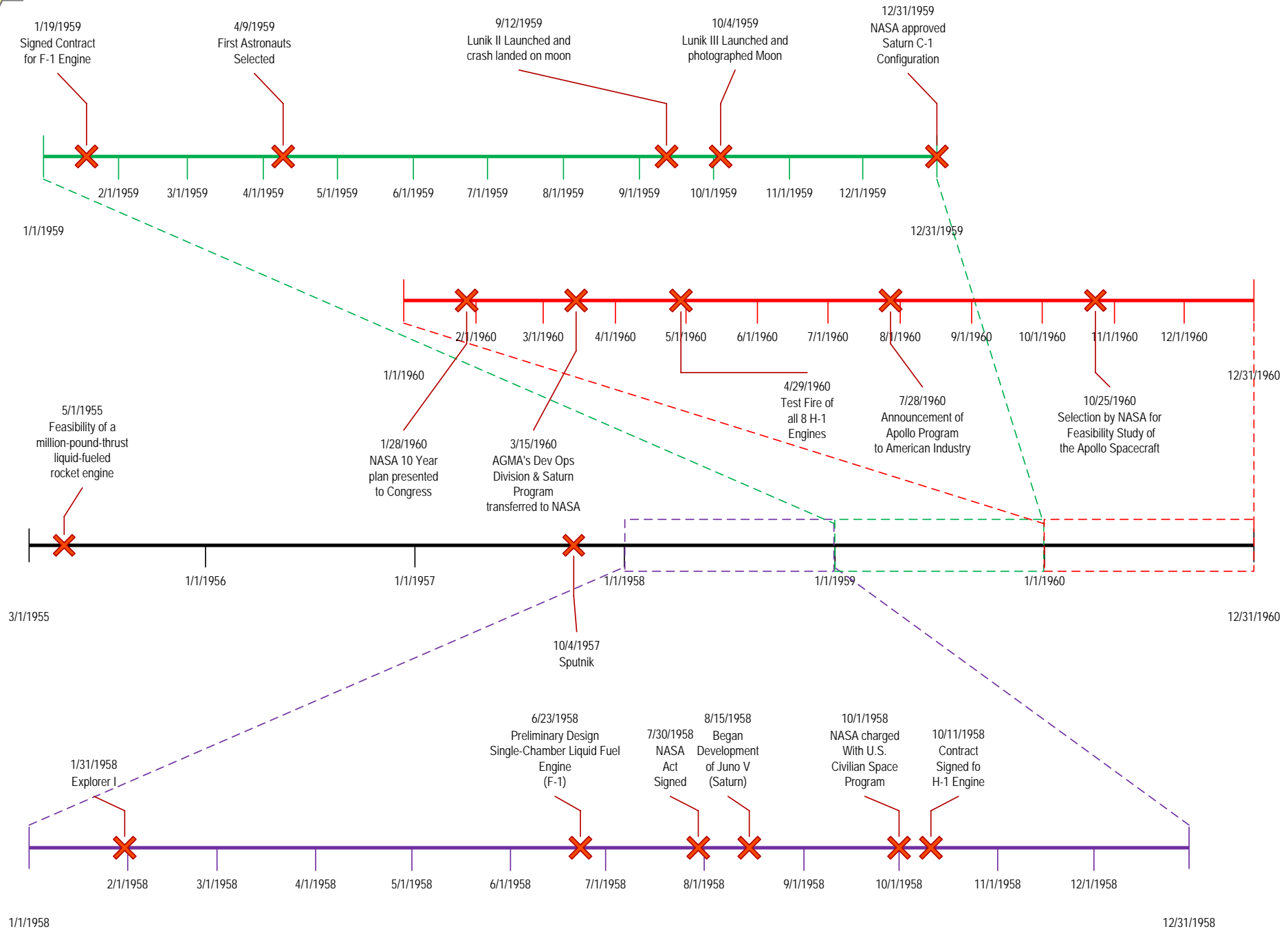


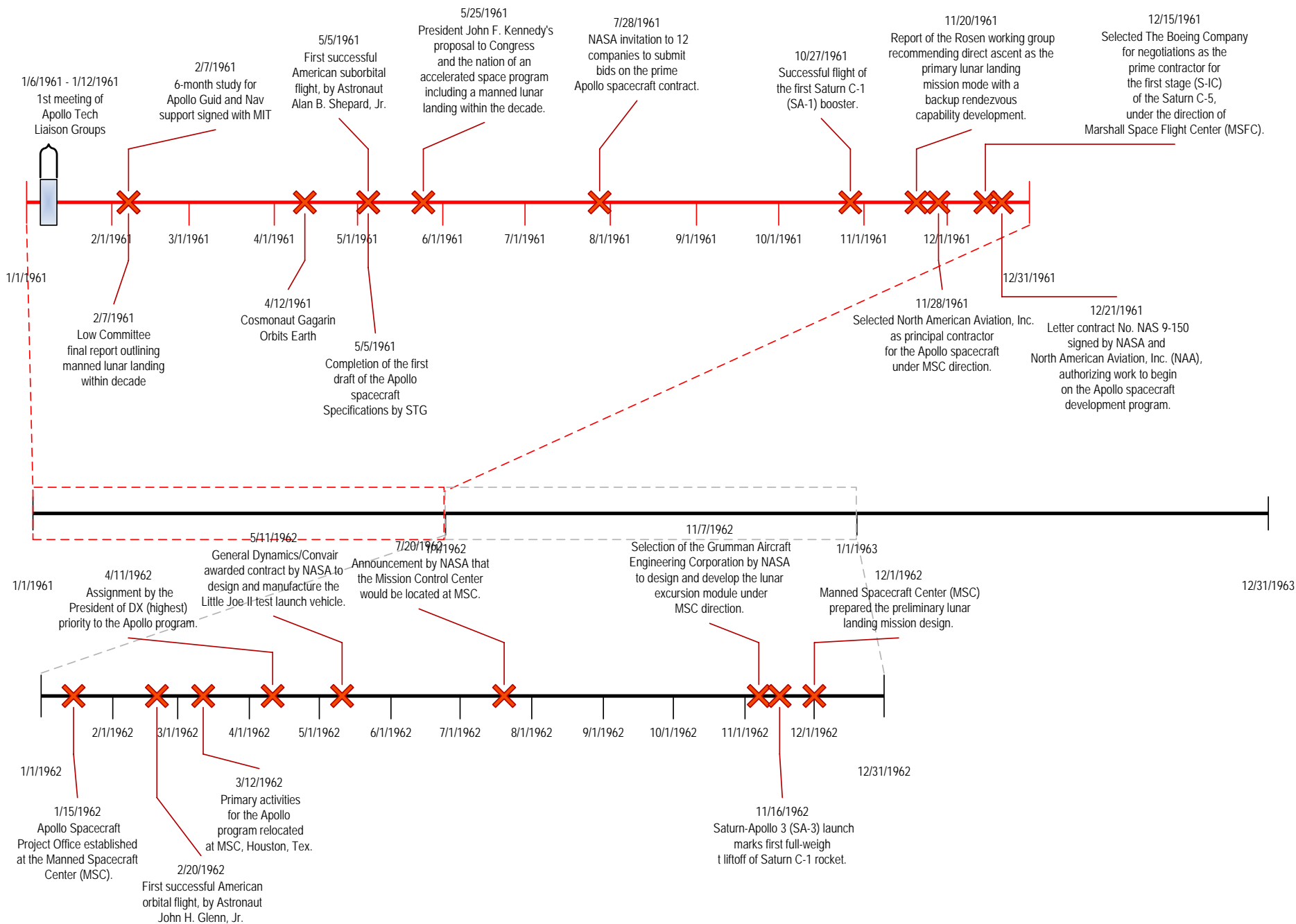
(7/1969)



(12/1972)







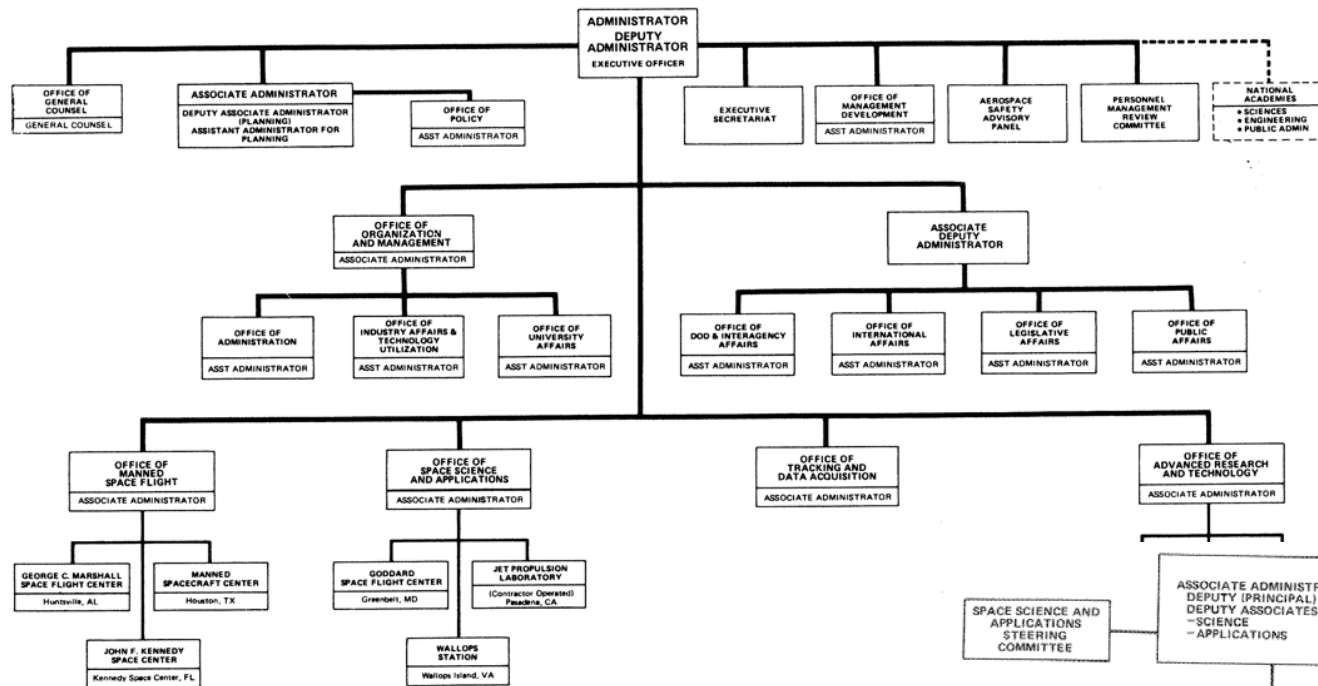


FIGURE 1.—NASA organization chart, October 30, 1970.

# How was it Managed?

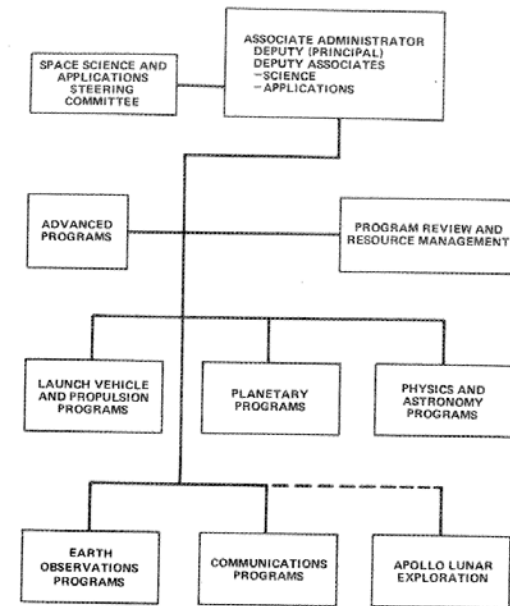


FIGURE 2.—Management structure of the Office of Space Science and Applications, 1971.





# How was it Managed?

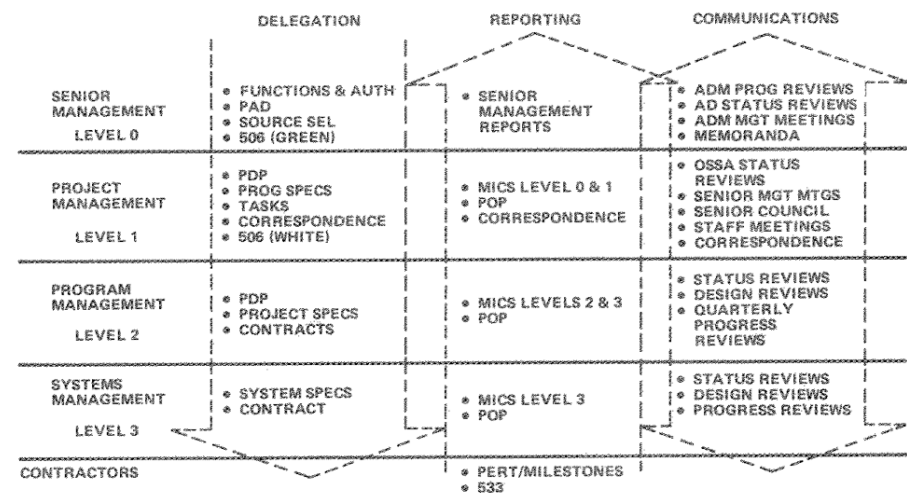


FIGURE 4.—OSSA formal management elements.



# Can you really get to the moon with only one WBS element?

level	WBS	Description
	1 914-AA	Command/Service Module

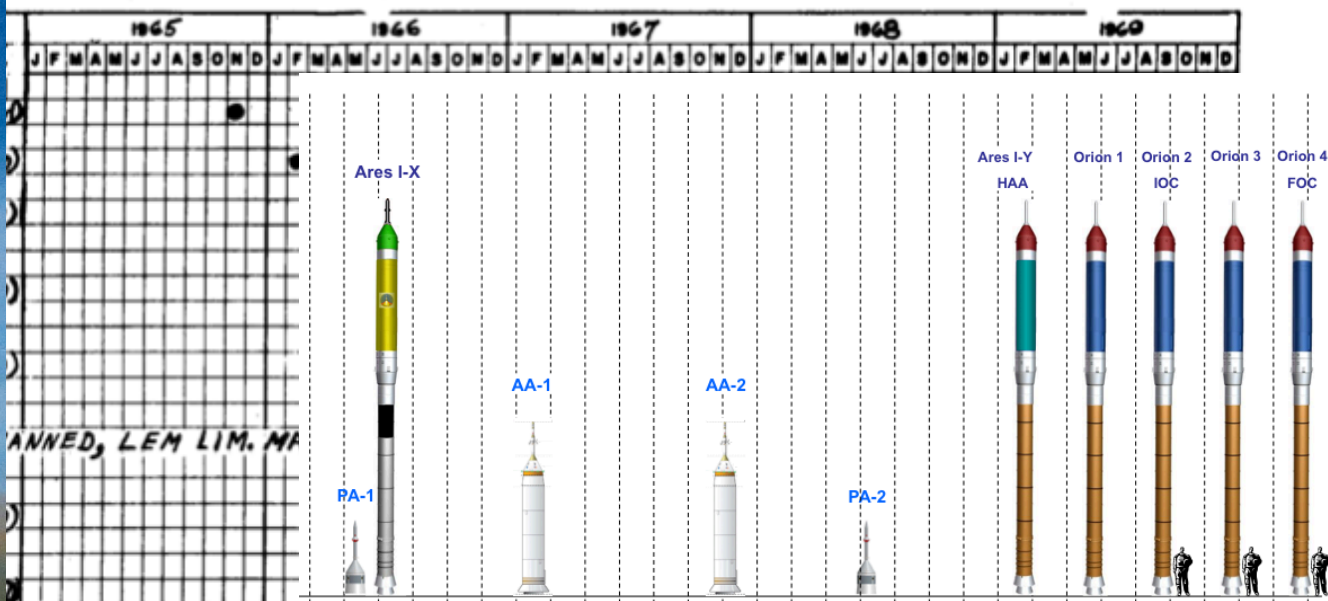




Commonalities

Challenges

Differences



V-1 CSM-FTA	SA 502 (UNMANNED)
LUNAR RETURN ENTRY (MAX LOAD)	
V-3 MAX DURATION	SA 503 (MANNED)
EARTH ORBIT CSM-LEM	
V-4, 5, 6 LUNAR MISSIONS	

Saturn I



10

Saturn I-B



4

Saturn V



2

#### Configurations:

6 Live S-IV stages  
5 LES flights with Jettison  
6 with active guidance

#### Anomalies:

1 premature engine cut-off

#### Configurations:

2 with Production Spacecraft  
4 with S-IVB stages

#### Anomalies:

1 premature S-IVB cut-off  
1 late sep (10 sec)  
1 stage destroyed d/t LH2 over-P (after mission objectives accomplished)  
1 erratic s/c cooling (even vent freeze)

#### Configurations:

2 with Production Spacecraft  
2 with S-II and S-IVB stages

#### Anomalies:

1 long SM entry burn (= higher entry vel)  
1 FS-induced oscillation (POGO)  
1 failure of S-IVB fail to restart  
1 with 2 S-II premature engine shutdown (igniter H2 line leak)  
1 inverted (stable 2) CM float (uprighted)

NOT REFLECT THE LEM  
TED TO NASA/MSO ON 19 F  
TING THE GAEC POSITION







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APOLLO SYSTEM SPECIFICATION (C)

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May 2, 1963

Office of Manned Space Flight  
National Aeronautics and Space Administration  
Washington, D.C.

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APOLLO COMMAND AND SERVICE MODULE  
SYSTEM SPECIFICATION (BLOCK 1)

1 October 1964 NAS 9-150  
Exhibit 1 Para. 4.2

Approved by

[Signature]  
Dale A. Myers  
Vice President  
Apollo Program Manager

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National Aeronautics and  
Space Administration

CxP 70000  
REVISION E

RELEASE DATE: OCTOBER 04, 2010

# CONSTELLATION ARCHITECTURE REQUIREMENTS DOCUMENT (CARD)

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The electronic version is the official approved document.  
Verify this is the correct version before use.

We can lick gravity, but sometimes the  
paperwork is overwhelming.

-- Wernher von Braun



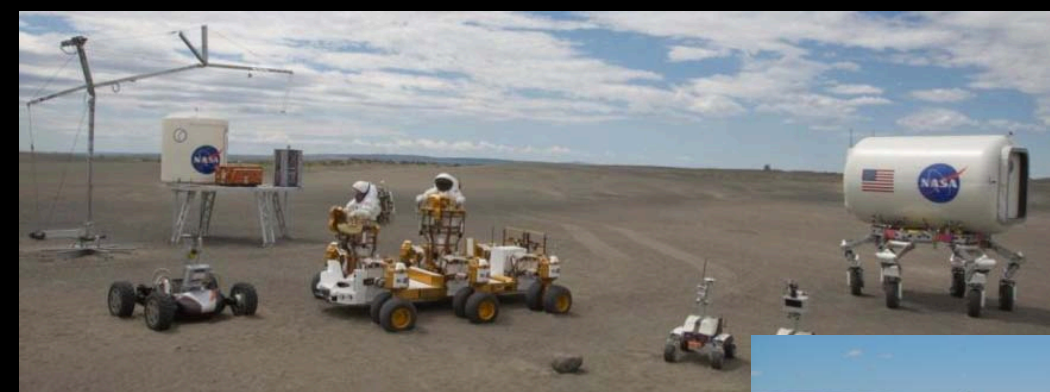
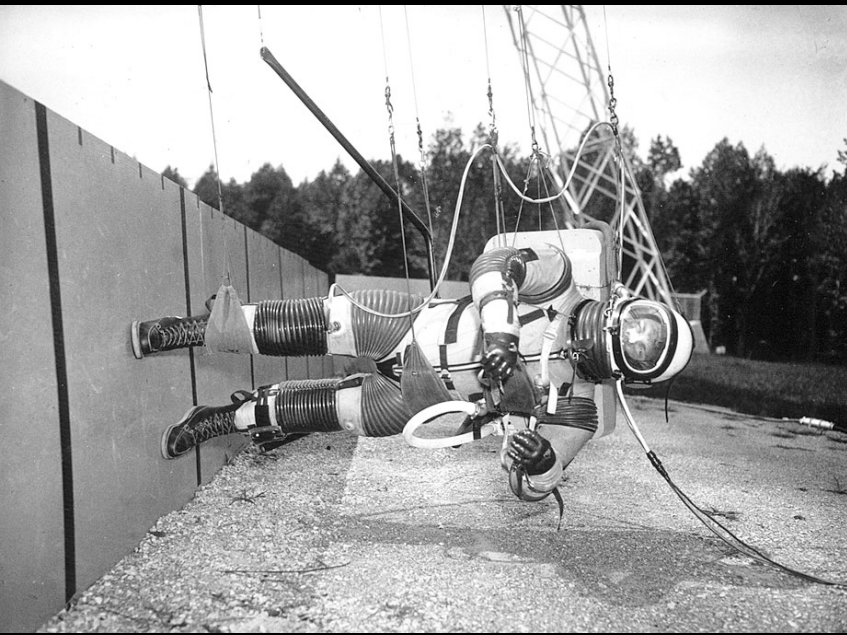




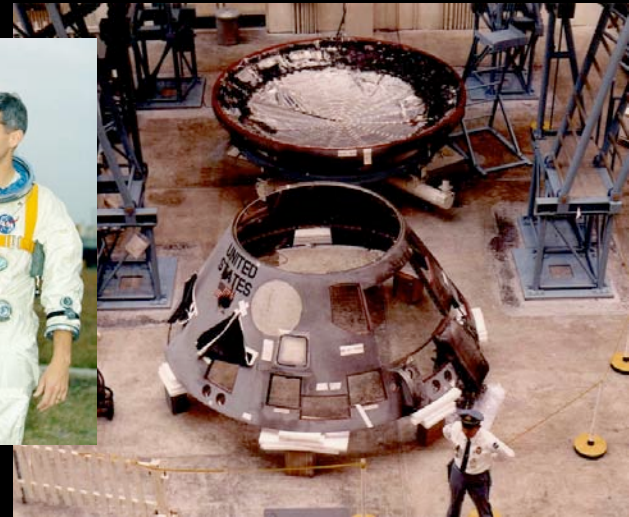
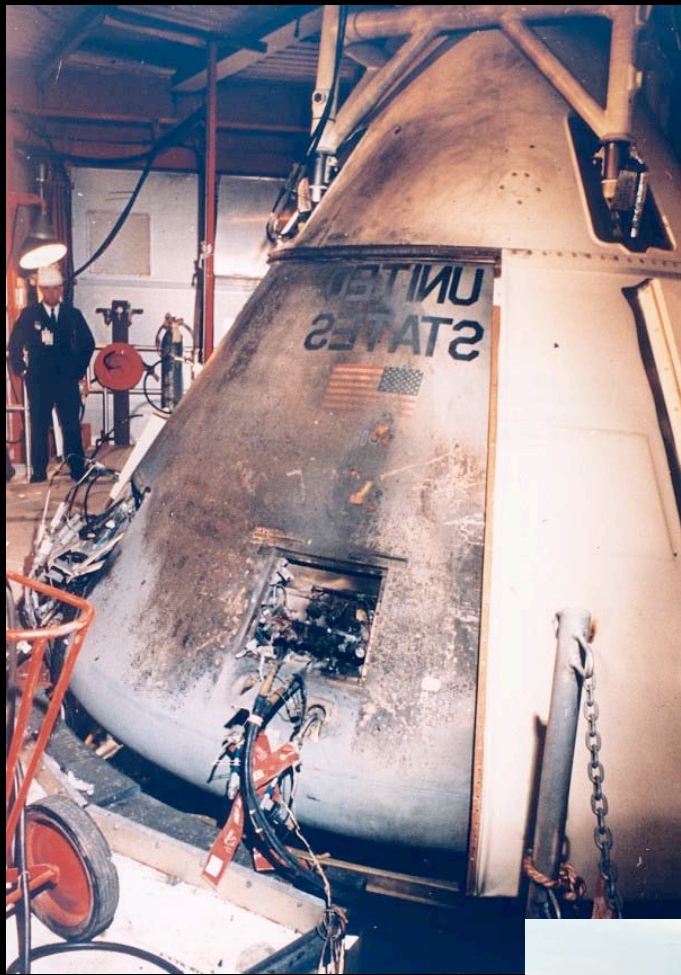








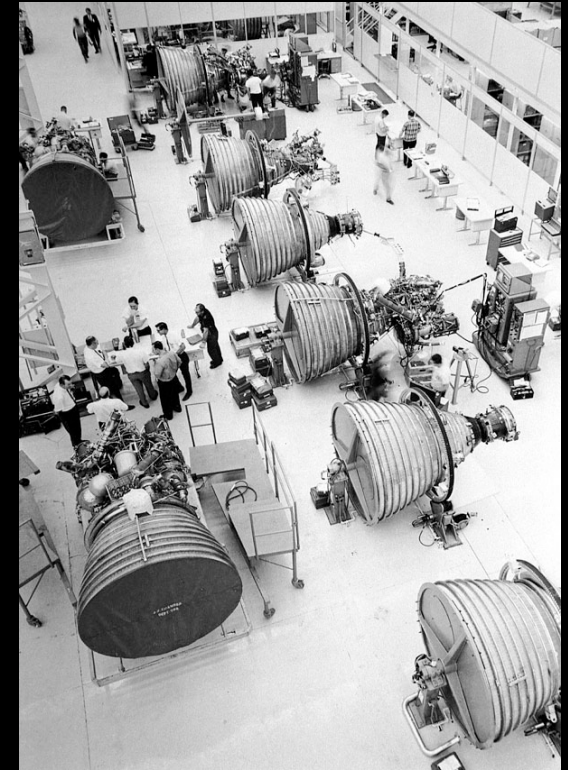
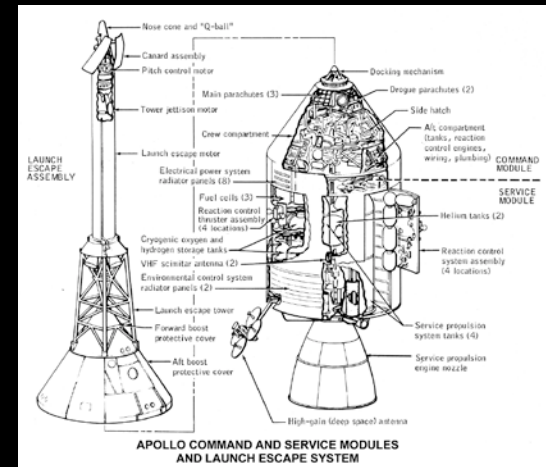








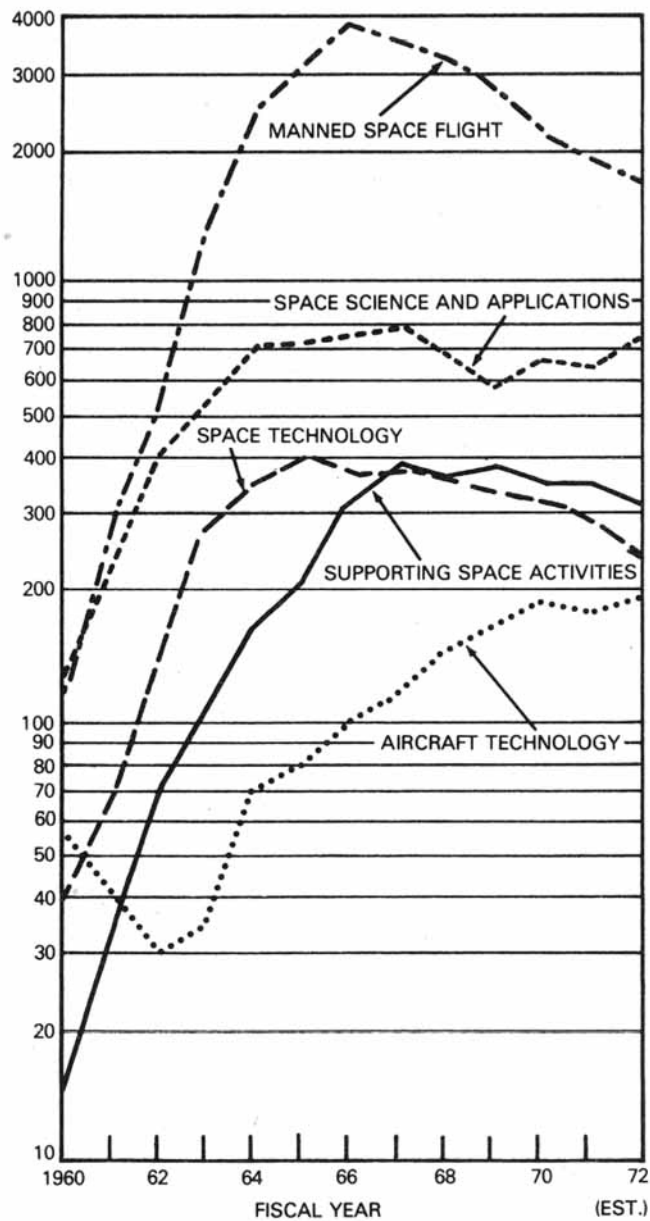




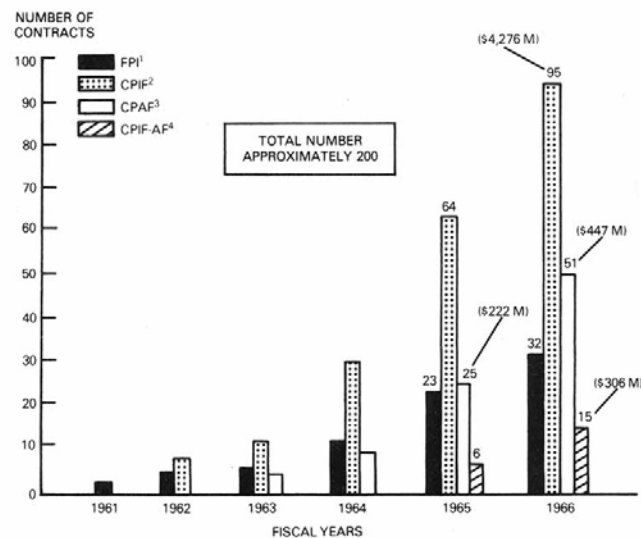


Was there really money flowing  
free during development and build  
(making cost, schedule, technical  
trades easy)?

(MILLIONS OF DOLLARS)



#### MANAGING NASA IN THE APOLLO ERA



<sup>1</sup>Fixed-price incentive

<sup>2</sup>Cost-plus-incentive-fee

<sup>3</sup>Cost-plus-award-fee

<sup>4</sup>Cost-plus-incentive-fee/award-fee

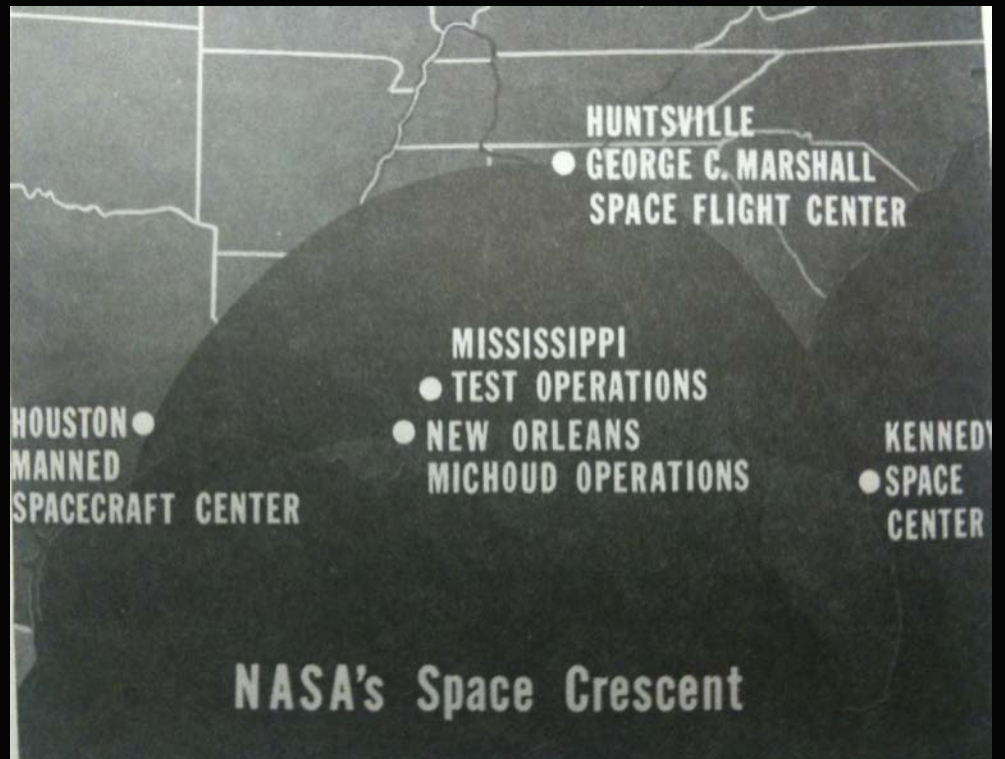
Source: *Procurement Program* (31 Oct. 1966), p. 17.

Figure 4-1. — Number of incentive contracts under administration by type of contract, FY 1961-1966.





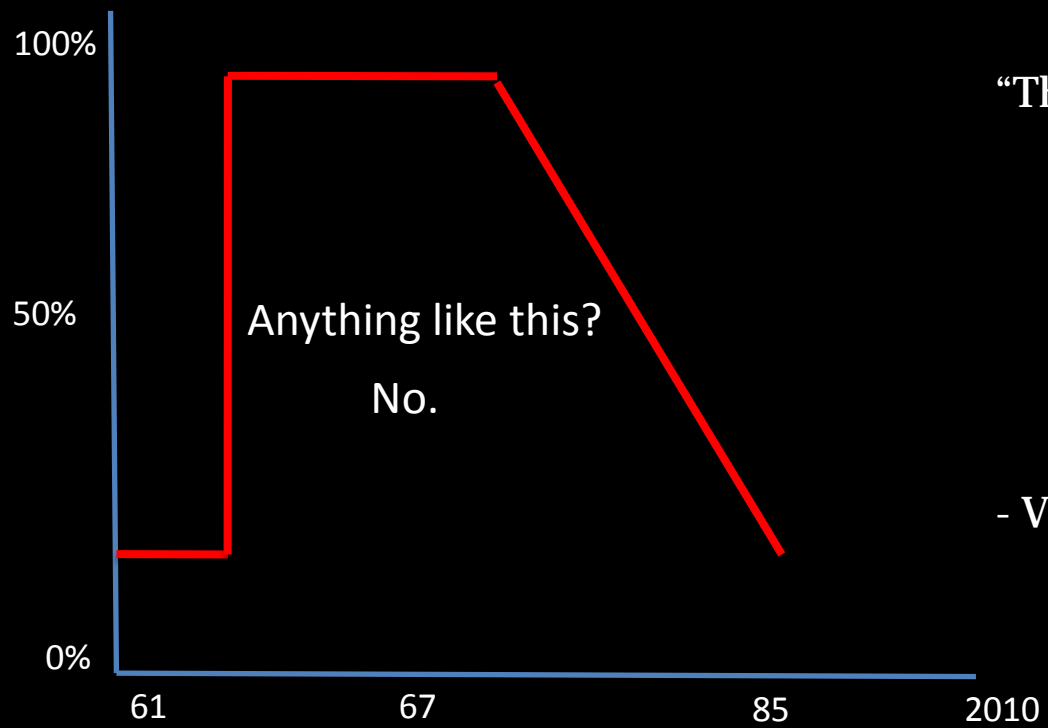






# Should the Govt fund trips to the moon?

## Public Support of Apollo? (always high?)



Anything like this?  
No.

“They believe that we are entitled to this kind of a thing forever, which I gravely doubt. I believe that there may be too many people in NASA who at the moment are waiting for a miracle, just waiting for another man on a white horse to come and offer us another planet, like President Kennedy.”  
- Von Braun.

I



Space

# 62 program and project managers surveyed

What problems pose the greatest obstacles to successful project performance?

## 1. Increasing complexity and time lag in the decision process

- The increasingly restricted resources available to NASA
- A con-current pressure for no failures in the launching and operation of any formal flight project.

Trend Borne out in:

- A less people oriented more formal management system
- Requirements for increasingly detailed reports
- A more time consuming review process at each point in the life cycle of a project

## 2. Need for greater responsiveness for divisions support to matrix-organized projects

3. Absorbing or reassigning staff upon project completion

4. Lack of project control over experimenters on flight projects

- Project Managers chief complaint is they are not able to exercise the same management or technical control over the design, fabrication, test and integration

5. Technical obsolescence amongst project staff

Strengths:

1. Competent persons on the project teams and in leadership positions

2. Concept of project organization flexible enough to be suited to tasks of great variety and scope

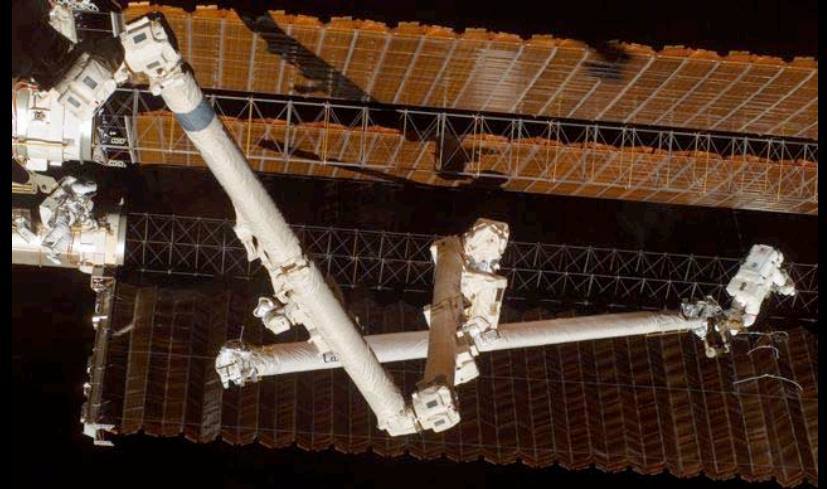
3. General organization and management environment in agency and field centers which supports project-type management

Most documents overemphasize: formal management system used. Also the skills and attributes of the project manager

Underemphasize role of program manager

**1973 study based on 1971 survey**

# Considering Legacy ...



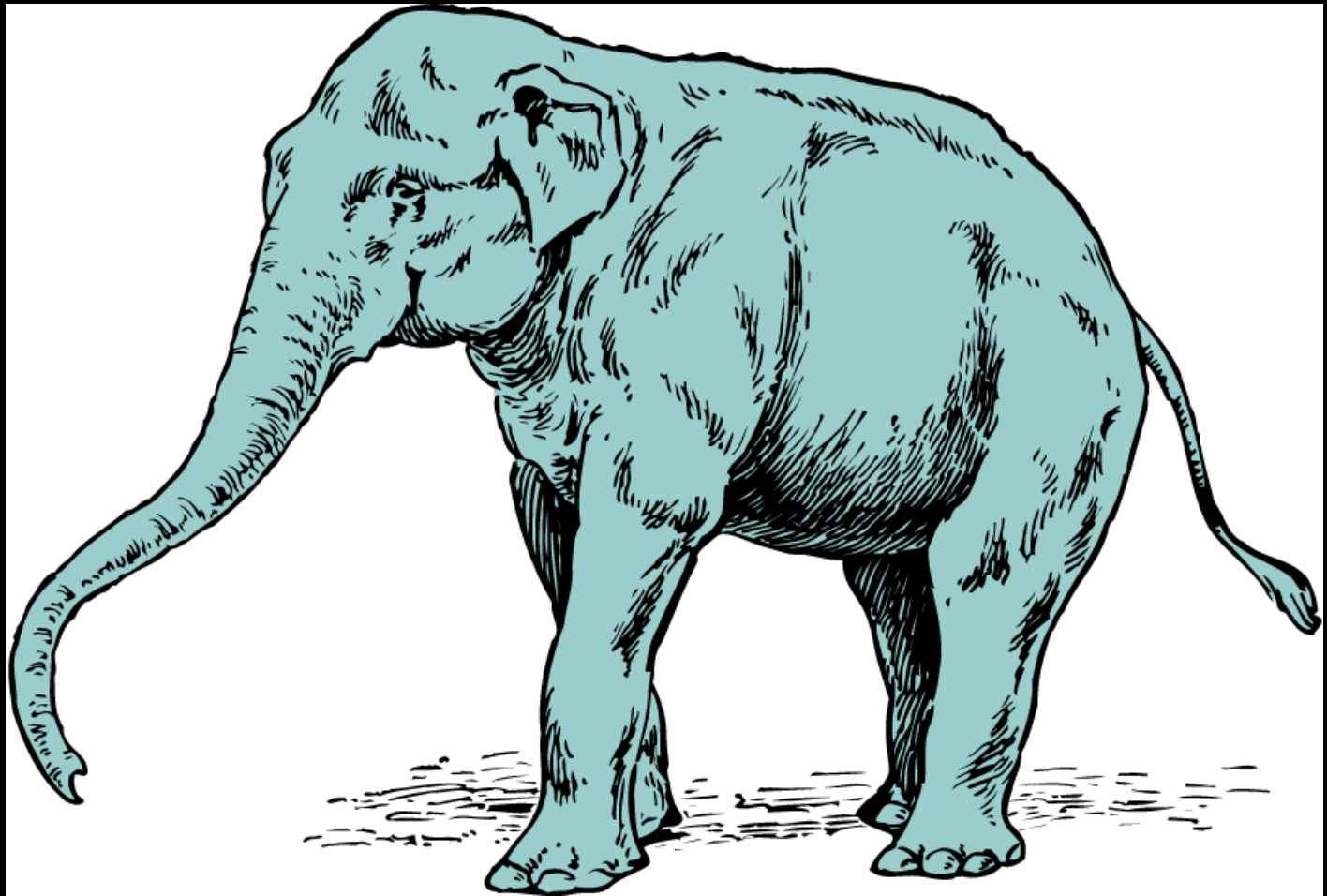


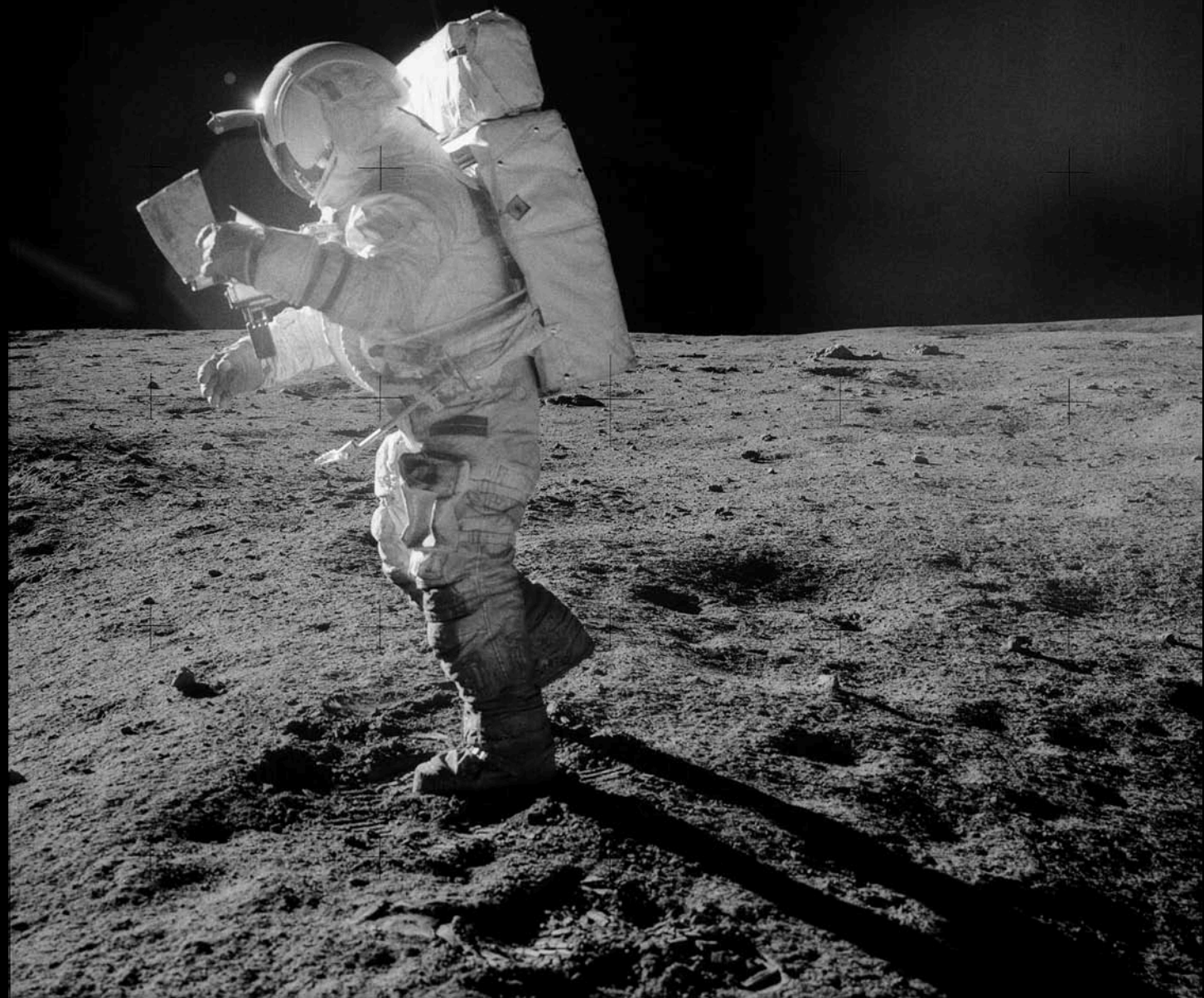
In their own words ...

# Was Project Management Life Really Better in Apollo?











BACKUPS

# Title: Was Project Management life really better in Apollo?

Apollo is still NASA's gold standard with the American public. The agency did what most people around the world considered the impossible on a schedule that was deemed optimistic, preposterous, or at the least challenging even to the most ardent supporters.

Our presentation will inform the participants how the Apollo Program was successfully developed and managed; how this influenced other Programs; and how this could be used by new project management professionals with equally lofty goals.

Considers questions of size, scope and insight as background for you as a project management professional:

- 1) Can you really get to the moon with only one WBS element?
- 2) Was there really money flowing free during development and build (making cost, schedule, technical trades easy)?
- 3) Are we wallowing in nostalgia in comparing current methods and circumstances to a managerial time which did not exist?
- 4) Was it like today, where each project management sees the clear value for all the integrators and data requests from above and know personnel below them see the value added of the Project Manager?

-- 50 word synopsis for website:

Can you manage a lunar program with one WBS? Was money really flowing freely all through Apollo? Are we wallowing in nostalgia and comparing current circumstances to a managerial time which did not exist? This talk discusses these and other questions as background for you as today's project managers.

# Bio

Ted Kenny is the Associate Project Manager for the Cx Mission Operations Project, an aficionado of space history (including as NASA project manager for the recent Apollo History project creating on-line lessons to help CxP personnel with Apollo background) and a heavy involvee in the creation of some more recent NASA history with the space station from the requirements phase through actually sending the ground commands to mate the first U.S. Elements together.

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# Kennedy Speech at Rice – 9/1962

appreciate your president having made me an honorary visiting professor, and I will assure you that my first lecture will be very brief.

I am delighted to be here and I'm particularly delighted to be here on this occasion.

We meet at a college noted for knowledge, in a city noted for progress, in a state noted for strength, and we stand in need of all three, for we meet in an hour of change and challenge, in a decade of hope and fear, in an age of both knowledge and ignorance. The greater our knowledge increases, the greater our ignorance unfolds.

Despite the striking fact that most of the scientists that the world has ever known are alive and working today, despite the fact that this Nation's own scientific manpower is doubling every 12 years in a rate of growth more than three times that of our population as a whole, despite that, the vast stretches of the unknown and the unanswered and the unfinished still far outstrip our collective comprehension.

No man can fully grasp how far and how fast we have come, but condense, if you will, the 50 thousand years of man's recorded history in a time span of but a half-century. Stated in these terms, we know very little about the first 40 years, except at the end of them advanced man had learned to use the skins of animals to cover them. Then about 10 years ago, under this standard, man emerged from his caves to construct other kinds of shelter. Only five years ago man learned to write and use a cart with wheels. Christianity began less than two years ago. The printing press came this year, and then less than two months ago, during this whole 50-year span of human history, the steam engine provided a new source of power. Newton explored the meaning of gravity. Last month electric lights and telephones and automobiles and airplanes became available. Only last week did we develop penicillin and television and nuclear power, and now if America's new spacecraft succeeds in reaching Venus, we will have literally reached the stars before midnight tonight.

This is a breathtaking pace, and such a pace cannot help but create new ills as it dispels old, new ignorance, new problems, new dangers. Surely the opening vistas of space promise high costs and hardships, as well as high reward.

So it is not surprising that some would have us stay where we are a little longer to rest, to wait. But this city of Houston, this state of Texas, this country of the United States was not built by those who waited and rested and wished to look behind them. This country was conquered by those who moved forward--and so will space.

William Bradford, speaking in 1630 of the founding of the Plymouth Bay Colony, said that all great and honorable actions are accompanied with great difficulties, and both must be enterprised and overcome with answerable courage.

If this capsule history of our progress teaches us anything, it is that man, in his quest for knowledge and progress, is determined and cannot be deterred. The exploration of space will go ahead, whether we join in it or not, and it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in this race for space.

Those who came before us made certain that this country rode the first waves of the industrial revolution, the first waves of modern invention, and the first wave of nuclear power, and this generation does not intend to founder in the backwash of the coming age of space. We mean to be a part of it--we mean to lead it. For the eyes of the world now look into space, to the moon and to the planets beyond, and we have vowed that we shall not see it governed by a hostile flag of conquest, but by a banner of freedom and peace. We have vowed that we shall not see space filled with weapons of mass destruction, but with instruments of knowledge and understanding.

Yet the vows of this Nation can only be fulfilled if we in this Nation are first, and, therefore, we intend to be first. In short, our leadership in science and industry, our hopes for peace and security, our obligations to ourselves as well as others, all require us to make this effort, to solve these mysteries, to solve them for the good of all men, and to become the world's leading space-faring nation.

We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and only if the United States occupies a position of pre-eminence can we help decide whether this new ocean will be a sea of peace or a new terrifying theater of war. I do not say that we should or will go unprotected against the hostile misuse of space any more than we go unprotected against the hostile use of land or sea, but I do say that space can be explored and mastered without feeding the fires of war, without repeating the mistakes that man has made in extending his writ around this globe of ours.

There is no strife, no prejudice, no national conflict in outer space as yet. Its hazards are hostile to us all. Its conquest deserves the best of all mankind, and its opportunity for peaceful cooperation many never come again. But why, some say, the moon? Why choose this as our goal? And they may well ask why climb the highest mountain? Why, 35 years ago, fly the Atlantic? Why does Rice play Texas?

# Kennedy Speech at Rice – 9/1962

We choose to go to the moon. We choose to go to the moon... (interrupted by applause) we choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.

It is for these reasons that I regard the decision last year to shift our efforts in space from low to high gear as among the most important decisions that will be made during my incumbency in the office of the Presidency.

In the last 24 hours we have seen facilities now being created for the greatest and most complex exploration in man's history. We have felt the ground shake and the air shattered by the testing of a Saturn C-1 booster rocket, many times as powerful as the Atlas which launched John Glenn, generating power equivalent to 10 thousand automobiles with their accelerators on the floor. We have seen the site where five F-1 rocket engines, each one as powerful as all eight engines of the Saturn combined, will be clustered together to make the advanced Saturn missile, assembled in a new building to be built at Cape Canaveral as tall as a 48 story structure, as wide as a city block, and as long as two lengths of this field.

Within these last 19 months at least 45 satellites have circled the earth. Some 40 of them were made in the United States of America and they were far more sophisticated and supplied far more knowledge to the people of the world than those of the Soviet Union.

The Mariner spacecraft... (interrupted by applause) the Mariner spacecraft now on its way to Venus is the most intricate instrument in the history of space science. The accuracy of that shot is comparable to firing a missile from Cape Canaveral and dropping it in this stadium between the 40-yard lines.

Transit satellites are helping our ships at sea to steer a safer course. Tiros satellites have given us unprecedented warnings of hurricanes and storms, and will do the same for forest fires and icebergs.

We have had our failures, but so have others, even if they do not admit them. And they may be less public.

To be sure,... (interrupted by applause) to be sure, we are behind, and will be behind for some time in manned flight. But we do not intend to stay behind, and in this decade, we shall make up and move ahead.

The growth of our science and education will be enriched by new knowledge of our universe and environment, by new techniques of learning and mapping and observation, by new tools and computers for industry, medicine, the home as well as the school. Technical institutions, such as Rice, will reap the harvest of these gains.

And finally, the space effort itself, while still in its infancy, has already created a great number of new companies, and tens of thousands of new jobs. Space and related industries are generating new demands in investment and skilled personnel, and this city and this state, and this region, will share greatly in this growth. What was once the furthest outpost on the old frontier of the West will be the furthest outpost on the new frontier of science and space. Houston, (interrupted by applause) your city of Houston, with its Manned Spacecraft Center, will become the heart of a large scientific and engineering community. During the next 5 years the National Aeronautics and Space Administration expects to double the number of scientists and engineers in this area, to increase its outlays for salaries and expenses to 60 million dollars a year; to invest some 200 million dollars in plant and laboratory facilities; and to direct or contract for new space efforts over 1 billion dollars from this center in this city.

To be sure, all this costs us all a good deal of money. This year's space budget is three times what it was in January 1961, and it is greater than the space budget of the previous eight years combined. That budget now stands at 5 billion 400 million dollars a year--a staggering sum, though somewhat less than we pay for cigarettes and cigars every year. Space expenditures will soon rise some more, from 40 cents per person per week to more than 50 cents a week for every man, woman and child in the United States, for we have given this program a high national priority--even though I realize that this is in some measure an act of faith and vision, for we do not now know what benefits await us. But if I were to say, my fellow citizens, that we shall send to the moon, 240 thousand miles away from the control station in Houston, a giant rocket more than 300 feet tall, the length of this football field, made of new metal alloys, some of which have not yet been invented, capable of standing heat and stresses several times more than have ever been experienced, fitted together with a precision better than the finest watch, carrying all the equipment needed for propulsion, guidance, control, communications, food and survival, on an untried mission, to an unknown celestial body, and then return it safely to earth, re-entering the atmosphere at speeds of over 25 thousand miles per hour, causing heat about half that of the temperature of the sun--almost as hot as it is here today--and do all this, and do it right, and do it first before this decade is out--then we must be bold.

I'm the one who is doing all the work, so we just want you to stay cool for a minute.

However, I think we're going to do it, and I think that we must pay what needs to be paid. I don't think we ought to waste any money, but I think we ought to do the job. And this will be done in the decade of the Sixties. It may be done while some of you are still here at school at this college and university. It will be done during the terms of office of some of the people who sit here on this platform. But it will be done. And it will be done before the end of this decade.

And I am delighted that this university is playing a part in putting a man on the moon as part of a great national effort of the United States of America.

Many years ago the great British explorer George Mallory, who was to die on Mount Everest, was asked why did he want to climb it. He said, "Because it is there."

Well, space is there, and we're going to climb it, and the moon and the planets are there, and new hopes for knowledge and peace are there. And, therefore, as we set sail we ask God's blessing on the most hazardous and dangerous and greatest adventure on which man has ever embarked.

Thank you.